

REMARKS

In the Office Action of April 3, 2002, Claims 1 - 7 were rejected. No claim was allowed. In response, Claims 4, 6 and 7 are canceled, Claims 1 - 3 are amended and new Claims 8 - 10 are added to the application. Reexamination and reconsideration are respectfully requested in view of the foregoing amendments and the following remarks.

Objections to the Specification

The Specification was objected to because of an informality. In particular, the Examiner states that HB1 cannot be an acrylate(Hy)/butyl acrylate (Hb) copolymer where R5 is H and Z1 is COOH since the carboxyl group signifies an acid and not an ester or salt.

In response, the specification is amended to read "acrylic acid (Hy)/butyl acrylate (Hb)". Accordingly, it is respectfully submitted that this objection is overcome.

Rejection of Claim 7 under 35 U.S.C. §102(b) over Audibert et al and Argillier et al

Claim 7 was rejected under 35 U.S.C. §102(b) as anticipated by Audibert et al (U.S. Patent No. 5,597,783) or Argillier et al (U.S. Patent No. 5,637,556). The Examiner alleges that the references disclose applicants' polymers.

In response, Claim 7 is canceled without prejudice or disclaimer.

Rejection of Claims 1 - 7 under 35 U.S.C. §102(b or e) or §103(a) over Lynn, Koga et al, Yamaguchi et al, Yamato et al, Bose or Oswald et al in view of Audibert et al or Argillier et al

Claims 1 - 7 were rejected under 35 U.S.C. §102(b) as anticipated by Lynn (U.S. Patent No. 4,525,500), Koga et al (U.S. Patent No. 4,662,942), Yamaguchi et al (U.S. Patent No. 4,888, 059), Yamato et al (U.S. Patent No. 5,707,445), Bose (U.S. Patent

No. 6,235,814) or Oswald et al(U.S. Patent No. 6,277,900) The Examiner alleges: that Lynn teaches cement and an aqueous polymer dispersion in claim 1, a copolymer of an alkyl acrylate and acrylic acid in claim 4, and sand in column 3, lines 35-56; that Koga recites cement and a sulfonated styrene-maleic acid copolymer in the Abstract, water with fine and coarse aggregate in the Examples; that Yamaguchi et al. divulge acrylic acid or its salt copolymerized with an acrylic ester in claim 1, water in claim 10, cement with fine and coarse aggregates in Tables 2 and 4; that Yamato et al. reveal a polyalkylene glycol copolymer in the Abstract, cement and water in claim 6, sand and gravel in Table 1; that Bowe displays masonry, acrylic acid or its salt copolymerized with an acrylic ester, water and fillers in claim 5, concrete in claim 6, and that Oswald present applicants' copolymer in claim 1, cement and water in claim 7, silicates in claim 8 and clay and barytes in claim 9. Audibert and Argillier are cited as teaching the specific polymers of the composition. The Examiner takes the position that the present claims are not novel, or, in the alternative, that it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use the polymers of the secondary references in the compositions of the primary references, in order to advantage of their low filtration rates.

This rejection is respectfully traversed as it may apply to Claims 1 - 3 and 5 as amended herein and new Claims 8 - 10. The present invention belongs to the field of invention of cement slurries to be set in a wellbore in a porous geological formation. On one hand, a cement slurry for a wellbore is different from well fluid, which is formulated to circulate up and down a well during the course of drilling activities. On the other hand, a cement slurry for a wellbore is different from materials such as mortar or other mixtures for building or molding, since the cement slurry must have a sufficient rheology to be pumped into a well. Therefore, to the extent that the compositions described in the cited references differ from the composition of the present invention, in terms of, for

example, the identity of the units or the molecular weight of the copolymer, there is no motivation to alter the disclosed composition because of the differences in intended uses.

Specifically, Lynn discloses a composition for cement mortars for building material. The reference does not disclose or suggest a cement slurry for a wellbore. Further, the reference does not disclose or suggest a copolymer having a molecular mass ranging between 500000 and 10^7 daltons and does not disclose or suggest silica particles with grain size ranges between 5 and 200 μm .

Koga discloses a composition wherein the molecular weight of the copolymer is 1,000 to 9,000. The reference does not disclose or suggest a copolymer having a molecular mass ranging between 500000 and 10^7 daltons. The reference does not disclose or suggest a cement slurry for a wellbore.

Yamaguchi discloses a cement dispersing agent wherein the copolymer has a molecular weight of 1000 to 50000. The reference does not disclose or suggest a copolymer having a molecular mass ranging between 500000 and 10^7 daltons and expressly teaches against a copolymer with a molecular weight over 50000 (col. 4, line 53). The reference does not disclose or suggest a cement slurry for a wellbore.

Yamato discloses an admixture including a polyalkylene glycol copolymer. The reference indicates that the molecular weight can be 3,000 to 1,000,000, but states that the most preferable molecular weight is 5,000 to 100000. Accordingly, the reference would teach against a molecular mass ranging between 500000 and 10^7 daltons. Further, the reference teaches a concrete mixture that contains river sand and does not disclose or suggest silica particles with grain size ranges between 5 and 200 μm . Finally, the reference does not disclose or suggest a cement slurry for a wellbore.

Bowe discloses a polymer as a modifier or coating for masonry applications. The reference does not disclose or suggest a cement slurry for a wellbore and does not

disclose or suggest a copolymer having a molecular mass ranging between 500000 and 10^7 daltons or silica particles with grain size ranges between 5 and 200 μm .

Oswald discloses a water-soluble copolymer for use in reducing water loss in cement slurries for cementing subterranean wells, and thus is the only one of the cited references that is in the technical field of the present invention. Oswald differs from the present invention in that the copolymer of Oswald is not defined as having both hydrophobic units and hydrophilic units as required in the present invention. In fact, the polymer described in all of the examples of Oswald is an AM/AMPS copolymer (AM denoting acrylamide and AMPS denoting acrylamide-2-methyl propane sulfonic acid), wherein both units of the copolymer are hydrophilic. Oswald does not disclose or suggest a copolymer having hydrophobic and hydrophilic units.

The secondary references, Argillier and Audibert disclose their copolymers as being useful for filtrate reduction in well fluids, such as drilling fluids, completion fluids or workover fluids. The technical field of well fluids is different from that of cement slurries for cementing well bores such that a person skilled in the art would not apply teachings from the field of well fluids to the field of cement slurries for cementing well bores. On one hand, a well fluid is a suspension of inert particles and cuttings, and the fluid is formulated for circulating up and down through a well bore. On the other hand, a cement slurry for cementing a well bore is a suspension of particles that interact to form a cement that holds the steel casing in place in the well bore. The Argillier and Audibert references do not contain any teaching or suggestion that the compounds disclosed therein would have any usefulness for filtrate reduction in the context of a cement slurry in a wellbore. Accordingly, there would have been no motivation for a person skilled in the art to combine the copolymers of Argillier and Audibert with the cement slurry of Oswald.

In view of the above, it is respectfully submitted that Claims 1 - 3, 5 and 8 - 10 would not have been obvious over Lynn, Koga, Yamaguchi, Yamato, Bose, Oswald, Audibert or Argillier, alone or in any combination.

Conclusion

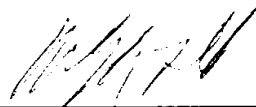
In view of the foregoing amendments and remarks, it is respectfully submitted that Claims 1 - 3, 5 and 8 - 10 are in condition for allowance. Favorable reconsideration is respectfully requested.

Should the Examiner believe that anything further is necessary to place this application in condition for allowance, the Examiner is requested to contact applicants' undersigned attorney at the telephone number listed below.

Kindly charge any additional fees due, or credit overpayment of fees, to Deposit Account No. 01-2135 (612.39487X00).

Respectfully submitted

ANTONELLI, TERRY, STOUT & KRAUS, LLP



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RTW/dlt

Attachment: Marked-up copy to show changes made



ATTACHMENT

MARKED-UP COPY TO SHOW CHANGES MADE

IN THE SPECIFICATION:

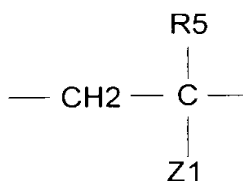
Please replace the first paragraph on page 7 with the following:

- Hb1 : ~~acrylate~~ acrylic acid (Hy)/butyl acrylate (Hb) copolymer, where R5 is H, Z1 is COOH, R'5 is H and Z2 is COOR'1 with R'1 being C4, comprising about 80 % acrylate units, and of molecular mass ranging between 10^4 and $5 \cdot 10^4$ daltons.

IN THE CLAIMS:

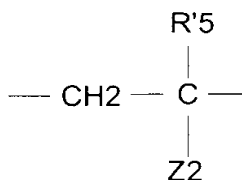
1. (Amended) A cement slurry intended to be set in a wellbore through at least one geologic formation having a certain permeability, characterized in that it comprises cement, at least one mineral filler consisting of silica with grain size ranges between 5 and 200 μm , water and a determined amount of at least one polymer with hydrophilic (Hy) and hydrophobic (Hb) units in aqueous solution, ~~said hydrophobic units (Hb) containing C6-C30 alkyl, aryl or alkyl-aryl groups,~~ said polymer having the following structure: ---(Hb)---(Hy)--- with a statistical distribution, and:

- Hy has the following form:



where R5 is H or CH₃, and Z1 is COOH or CONH₂ or CONHR¹SO₃, or CONHR¹I, R¹I is CH₃;

- Hb has the following form:



where R'5 is H or CH3 and Z2 is COOR7, C6H4SO3H, COOR'1, CONR1R'1 or CONR1R7, R7 being a non-ionic surfactant consisting of an alkyl polyoxyethylene chain, R1 is H or a C1-C30 alkyl, aryl or alkyl-aryl radical, and R'1 is a C9-C30 alkyl, aryl or alkyl-aryl radical,

wherein said polymer has a molecular mass ranging between 500000 and 10⁷ daltons.

2. (Amended) A slurry as claimed in claim 1, wherein said polymer has a ~~molecular mass ranging between 10⁴ and 10⁷ daltons~~ and a proportion of hydrophobic units Hb ranging between 0.5 and 60 %.

3. (Twice Amended) A slurry as claimed in Claim 1, comprising at least one of the polymers selected from the group consisting of:

- HMPAM, where R5 is H and Z1 is CONH2, R'5=CH3 and Z2 is COOR'1 with R'1=C9H19,

- S1, S2 where R5 is H and Z1 is CONH2, R'5=H and Z2 is C6H4SO3H;

- ~~HbI where R5 is H, Z1 is COOH, R'5 is H and Z2 is COOR'1 with R'1 being C4.~~